Bay County
Department of Water And Sewer

3933 PATTERSON ROAD, BAY CITY, MICHIGAN 48706-1993
TELEPHONE: (989) 684-3883 • FAX: (989) 684-5510 • TTY: (800) 649-3777
www.baycodws.org
THOMAS W. PAIGE, DIRECTOR

JAMES C. LILLO, P.E.
ENGINEER-MANAGER

2600 E. BEAVER ROAD
KAWKAWLIN, MICHIGAN 48631
(989) 686-4610

To: Mr. Eric Pocan
Office of Drinking Water and Municipal Assistance
Revolving Loan Section
Constitution Hall 3rd Floor South
525 West Allegan Street
Lansing, MI 48933

CC: Mr. Grant Gartrell, PE, Project Manager, CDM Smith

From: Mr. Thomas W. Paige, Director, Bay County Dept. of Water and Sewer TWP

Date: March 15, 2013

Re: Bay Area Water Treatment Plant – Project No. 7380-0
Qualification for Green Project Reserve Funding

The purpose of this memo is to document the basis for determining that Bay County Road Commission/ Department of Water and Sewer DWRF Project No. 7380-01 qualifies for the Green Project reserve funding under DWRF. This project is a new 17.4 MGD membrane water treatment plant (WTP) on the existing City of Bay City Water Treatment Plant site. The new membrane WTP will include new raw water pumping units, membrane treatment system, high service pumping units, and two finished water storage tanks.

In 2010, Bay County Road Commission/ Department of Water and Sewer commissioned the development of the Bay Area Water Treatment Plant DWRF Project Plan. The project stems from a need for a safe water supply, a need for adequate treatment to meet regulations, and a need to address reliability deficiencies in the present system. Numerous issues with the source water from Saginaw Bay and an aging intake and treatment system have arisen at the Bay City WTP. Specifically, raw water quality from the existing Bay City intake is subject to rapid fluctuations resulting in the need for operators to adjust chemical feeds and the treatment process. Considering chemical feeds for coagulation, disinfection and corrosion control, meeting regulations can be difficult with variances in raw water quality. Reliability is a major concern in that facilities have aged beyond the design life.

The components of the WTP to be considered for Green Project Reserve funding are as follows:

a. Membrane Water Treatment Plant - A new membrane water treatment plant will significantly reduce the use of chemicals in water treatment. As opposed to conventional treatment like that at the current Bay City Water Treatment Plant, a number of chemical feeds will be eliminated with a new membrane WTP such as chemicals added for flocculation, sedimentation and softening. The combination of converting to the Saginaw Midland Municipal Water Supply Corporation and incorporating membrane treatment will greatly reduce the generation of residuals. In fact the residuals treatment will no longer be needed in that the waste stream discharge will be of an adequate quality and quantity to be discharged to surface waters or sanitary sewer. A membrane WTP qualifies under the category of Environmental Innovation. Specific chemical and residual reductions will consist of the following based on a daily average plant production of 8.4 MG.

- Elimination of lime, 41.5 mg/L or 1,027,523 lbs. /yr.
- Elimination of ferric sulfate, 7.1 mg/L or 182,664 lbs./yr.
- Elimination of ozone, 1.6 mg/L.
- Elimination of polymer Cat Floc T, 0.7 mg/L or 20,992 lbs./yr.
- Elimination of potassium permanganate, 0.15 mg/L or 3,925 lbs./yr.
- Conversion of gas chlorine to liquid hypochlorite
- Elimination of lime sludge residuals, 4,564 wet tones/yr. or 1,597 dry tons/yr.
- Elimination of filter backwash residuals, 90.6 MG/yr.

Expected chemical usage of the new membrane plant is predicted to consist of the following

- Sodium hypochlorite (3.4 mg/L, same as current)
- Sodium hydroxide (tentative for corrosion control, 3 mg/L)
- Fluoride, 0.7 mg/L, same as current feed rate
- Polyphosphate, 1.0 mg/L, same as current feed rate
- Membrane cleaning will consist of citric acid 650 gallons per month, sulfuric acid 30 gallons per month, coagulant (preliminary design for ACH at 6 mg/L), sodium bisulfite 500 gallons per month
- Residuals from membrane backwashing estimated at 30,000 gallons per month

b. Variable Frequency Drives – Variable Frequency Drives (VFD's) are included for pumps for the new membrane WTP. VFD's allow the pumps to be slowed to meet changes in water demand and thereby save energy by minimizing stopping and restarting pumps. The largest power draw exerted by a pump takes place upon start up. VFD's also eliminate energy lost associated with the need to use valves to throttle pumps to meet demand. VFD's typically provide an energy savings upwards of 25% which would qualify under the category of Energy Efficiency.

c. Secondary Membrane – The membrane water treatment plant includes a second set of membrane treatment skids with the specific purpose of saving water. With a standard membrane WTP configuration, approximately 3.9% of the design plant flow goes to waste as a result of membrane backwashing and cleaning. Installation of the second set of membrane skids to treat the waste stream will reduce the stream from 3.9% of the plant flow to .75%. The effluent from the secondary treatment skids will be disinfected and mixed in with the total WTP effluent. Use of the secondary membrane treatment skids to recycle water qualifies as categorically eligible. This feature is considered water efficient compared to traditional technologies in that a conventional WTP typically has a waste stream of 2-3%.

Based on the information supplied by the Bay County Road Commission/ Department of Water and Sewer, this project does qualify for Green Project Reserve funding. The new membrane WTP will improve water quality; reduce the need for chemicals, save energy in pump operation, and save water. The costs that qualify for green project reserve will be determined after bids are received and the amount of the loan established. At that point, the percentage of this loan that is provided by DWRF can be applied to the total amount spent on this portion of the project to determine the green project reserve.